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THE ANALYSIS AND CAUSE OF THE
EXISTENCE OF MEMORY



PART TWO

ANALYSIS AND CAUSE OF UNCON-
SCIOUSNESS AND SLEEP

BY
LYSANDER S. RICHARDS

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Princeton University.

Presented by

Mr. L. I. Richards.

PART ONE

THE ANALYSIS AND CAUSE OF THE EXISTENCE OF MEMORY



PART TWO

ANALYSIS AND CAUSE OF UNCON- SCIOUSNESS AND SLEEP

BY ^{Salmon}
LYSANDER S. RICHARDS, 1835-

*Author of "Vocophy" Indicating the Vocation One is Best
Fitted to Follow—2. "Breaking Up or The Birth, De-
velopment and Death of Our Planet in Story"—3.
"The Universe: a Description in Brief"—4. "The
History of Marshfield in Two Volumes"—5.
"New Propositions in Speculative and
Practical Philosophy"—6. "The
Beginning of Man and What
Becomes of Him"*

1920

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By **LYSANDER S. RICHARDS**

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PREFACE

All my long life of 85 years after reaching the age of reason and manhood, I have been a faithful and searching student of the sciences and philosophical subjects, sandwiched in between my daily physical and mental labors, and at my advanced age I am still a psychological student, searching the whys and wherefores of certain mental activities in every day life. This is the eighth book I have written and published, as will be seen enumerated on the "fly leaf" of this book, all of which can be found in most of the city public libraries in New England and many other public libraries in the United States. I am always glad to hear from my readers.

L. S. RICHARDS.

Marshfield Hills, Mass.

April 29th, 1920.

(RECAP)

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PART I.

THE EVOLUTION, ANALYSIS AND CAUSE OF THE EXISTENCE OF MEMORY.

CHAPTER I.

My investigation of that portion of the mind known as memory was suggested by the desire to know how it was possible to find room upon any portion of the brain or the whole of it, for the impressions which is claimed to be stamped thereon to enable memory to recall the multitude of events and scenes that have come to our notice during our past lives. For example, take my own experience of a long life of 85 years. Think of the multitudinous scenes in crossing the Continent from the Atlantic to the Pacific, not only the broad landscapes that meet our view, in towns and cities, but the extended prairies, the Rockies, the Sierra Nevadas, the Great American Desert and all the varied places coming to our notice, the mines of Cali-

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ifornia and Nevada, the Yosemite and Big Trees, the placid waters of the Pacific, the extensive vineyards and fig trees, the thousand and one attractions one meets in travel, beside the surroundings about your home and the adjacent country, that your vision is bound to take in, aside from the impressions made in your conversations with the other fellow that you have chanced to meet in a life time and the knowledge you have gained by study and experience, whether acquired in the world of letters or by contact with everybody in every day life, words, phrases, knocks met somehow and somewhere at all times, how it is possible to find room in our brains to impress or stamp thereon all or the fractional part of the scenes and doings of a life time. Various works on Psychology and treatises on Memory I have carefully studied in one of the largest libraries in America, the Congressional Library in Washington, D. C., as well as carrying on correspondence with professors of Psychology in some of our greatest colleges and universities, but fail to find any well established theory that gives any clue to the solution of the problem. Professors are not agreed upon it, and one writes it is not explainable. But as a layman and an investigator, I shall venture a solution, whether or no it is endorsed. At this point I

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think I will put in the correspondence passed between us, I will mention only one and will give my questions submitted first:

“Dear Professor:

“I am spending my winter in Washington and most of the time in the Congressional Library and am investigating the subject of Memory, but after looking over several books on the subject, I failed to find the information I want. What I am after is to find out what is the primal cause of memory, from what source does it originate? Prof. Meummen in his work on Memory tells us it is founded upon consciousness, well that does not seem to satisfy my inquiry. For example, I can remember events 75 years back, very clearly, not only names, but places, residences, landscapes surrounding the buildings, my native place, and distant places of interest viewed along the pathway of life. We are told all these things are imprinted upon our brain, and that is why we can recall them so readily. Well now what puzzles me is, how is it possible to find room enough in our brain to register or imprint all the phenomena of our past life, the thousand, aye tens of thousands of incidents and images we have seen, as in my own experience of 85 years existence. How do you account for the existence of memory? How

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is it possible to memorize things that have happened in the multitudinous events and scenes of a long life? We are conscious of these thousand and one things of course, but what is it that enables us to record and remember them, the primal root that underlies the whole business? I cannot find anything in the Congressional Library or Boston Public Library that explains the cause satisfactorily. Can you enlighten me. An early reply will very much oblige.

"Cordially yours,
"LYSANDER S. RICHARDS."

I will quote in full a reply from one of my correspondents, an eminent professor of Psychology in a leading university of New England:

"Psychological Laboratory.

"Dear Sir:

"I am in receipt of your letter of Jan. 18th asking certain questions about the problem of Memory. I am surely at a loss what literature to suggest in order that you may find any adequate answer to your question as to what is the primal cause as a root of our memory processes. Psychology nowadays, like other natural sciences, has pretty much ceased to speculate on ultimate causes and as in physics for instance, confines itself to a gathering of

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facts, their classification and an attempt to discover uniform laws.

In this phase of the matter, there is of course you know a wealth of literature, but I know of nothing that would enable us to specify any more ultimate cause for memory than the change undergone in the course of our lives by the nervous system. As for the possibility of having recorded in such relatively small compass, the thousand of facts over which our memory has command, I do not feel the seriousness of the problem. As you may know the nervous system is made up of microscopic elemental units called neurons, of which you know there are probably some ten thousand million or more, how these neurons are interconnected by mere contact, that since each neuron has many processes projecting from it one can see that there are millions and millions of possible connections that may be established between different neuron systems."

I am not at liberty to give the name of my informant.

CHAPTER II.

Of course it must be a matter of speculation, at any rate in the present limited knowledge of the facts in the case, and cannot be otherwise until microscopic development has sufficiently advanced, perhaps centuries to come, to make it by actual observation an absolute certainty, an actual fact, and not a hypothesis. This, however, I believe is a possibility. Look at the advance of microscopic observation in the past 50 years in the many varieties of germs that have been discovered, not only discovered, but applied by the medical profession in the eradication of heretofore fatal diseases by individual, expeditious, scientific rational treatment, such as the use of Antitoxin for diphtheria and the Pasteur treatment discovered by Pasteur for hydrophobia, the purifying treatment of milk, the discovery through the aid of the microscope of typhoid fever germs and numerous other germs which the medical profession apply for the benefit of mankind, hence I think it reasonably possible

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that the time will arrive in the not distant future, when the impressions somehow and somewhere in the brain will be manifest in some manner and form recognizable by a greatly improved microscope.

CHAPTER III.

To make myself clear in this discussion, I must give the outline or description in brief of the formation of the brain, especially as applies in its relation to memory, that the reader who may not happen to be familiar with the physiology of the brain mass may better understand the subject under consideration. The brain is divided into two parts, the right and left hemispheres, and these again are divided in three parts, the Cerebrum, the Cerebellum, and the Medulla Oblongata. The Cerebrum is the frontal portion of the brain and contains the larger proportion of the intellectual faculties. The Cerebellum is the little brain back of the head, and is the seat of the animal propensities. The Medulla Oblongata is located at the base of the Cerebellum or head of the Spinal Cord. The brain is again divided into several lobes, the frontal which is situated in the front part of the brain and the parietal located at the top or middle portion, and the occipital which is situated in the back portion.

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We look for the highest, the reasoning faculties in the frontal portion, the moral faculties we find located on top, while the low, the animal faculties occupy the back and base of the brain. The shape or form of the encephalon, or brain outline differs in various species of the animal kingdom. The brain of the rabbit, the dog, the horse, in fact nearly all the quadrumana is elongated. In the approach to man, the brain grows deeper, thicker, rounder and less elongated.

The anthropoids as in the ape, the chimpanzee, the oran outang, the gorilla, and in the monkey the brain is more rounded, the monkey however is not as well shaped and not as intelligent as the oran outang or chimpanzee. The gorilla, although possessing a large body and more powerful, the cerebrum is not as well developed, the cerebellum or occipital portion predominates. The chimpanzee, the oran outang approaches nearer to man in roundness and good form, than any in the animal kingdom; in fact, the shape of his head is a perfect image of man. In size and weight in comparison to the brain of man, it is much less, weighing in the largest but 14 or 15 ounces, while a full grown man weighs from 50 to 60 ounces, as for example, Cuvier the eminent palaeontologist, and Daniel Webster,

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the statesman. The distinction in the inner portion of the brain is further marked by its convolutions in vertebrates, that is instead of the brain mass as in the lower order of vertebrates being smooth, it is convoluted or folded over in elongated rounded mass with well defined crevasses between each folding all through the brain mass. It had its highest and greatest folding in man, for the greater the convolutions or foldings, the greater the intelligence as displayed in human being, although the elephant and whale possessing an enormous body, they necessarily possess a larger encephalon, but a smaller cerebrum or front brain than man, and although they have many convolutions, the crevasses or fissures are not as deep and do not have the depth of gray matter which is found in the deep convolutions of man, marking the distinction in his superior intelligence. The cerebellum in these two mammoths predominates.

CHAPTER IV.

Cells.

The cells that contribute to the make up of the brain of man are extremely numerous, not only thousands but millions of them. They are of course minutely microscopic. All animal life, or nearly all have more or less cells in their organism, some, as in the species of Mollusks, have only a single cell, but in the evolution of animal growth from the invertebrates into vertebrates and from the lower vertebrates to higher forms in the scale of intelligence, the number of cells in the brain increases, and in or on these cells somehow and somewhere memory must have a lodgment, and as we all know it is not confined to man. Go back to the invertebrates, the insect, for example the ant, the bees, the wasps. A case is narrated by an observer who was in the habit of leaving his window open in his office and a wasp was in the habit of flying through the opening from its nest in the corner of the room and one day the

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window happened to be closed, the wasp in its daily flight not observing the closed window flew against it and fell upon the floor partially stunned, but soon recovering started up and flew around the room endeavoring to find a place of exit and at last found a little crack through which it made its exit out of doors. It was not long before it flew back through the hole or crack and sped to its nest in the corner of the room. Some time after it emerged from its nest and instead of attempting to fly through the opening in the window, it remembered the blow it got against the glass which stunned it, it flew direct to the crack through which it made its exit, and soon returned the same way, and never afterwards did it attempt to fly through the open window, but always flew through the hole it had discovered. That was a clear case of memory existing in the brain of that wasp, not instinct, for instinct would have caused it to fly through the open window, but remembering it got badly bumped against the closed window, it reasoned that it would not make that fool attempt again. We talk about instinct, instinct is nothing but the force of a long continued habit acquired through many generations and becoming an hereditary transmission, passed down from generation to generation, otherwise how did the first wasp, bee

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or ant acquire its so-called instinct, in performing certain flights or direction in striking a bee line in reaching a fixed place, if not the gradual development of this habit. A horse if given a free rein, in passing a driveway previously traveled, will invariably turn readily into it. That is not instinct, it is simply the force of habit, an exercise of memory, that directs that faculty to swing or move in the direction suggested.

One of my townsmen who is an actor, has for the past five years been performing in Great Britain, in a sort of a wild west play, where it required three ponies to carry out the features of the play. Previous to his passage to England five years ago, these three ponies were resting during his summer vacation in my village of Marshfield Hills, Mass. On account of the war in England, he was obliged, after five years absence to return home for a while to said village, and after his arrival he engaged a party at the Hills to go to Boston, a distance of 30 miles, and get the ponies and drive them home. When they arrived at Little's bridge over the North River, the dividing line between Marshfield and Scituate, a mile from the stable, the three ponies were given a free rein, and although they passed several main thoroughfares of

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travel, right and left, they turned around an abrupt corner at right angles and passed down the road and soon turned into the driveway to the stable where they lodged five years before. There was an instance of memory impressed on their brain, not instinct as commonly interpreted, but a clear case of memory, a remembrance, a fact that they had not forgotten, and used it to their advantage. Bees are known when they fly a long way from their hive, to get bewildered and flutter about here and there to find the direction of their hive, after circling about for a while and getting by chance nearer in the direction of their home, they discover their whereabouts and at once they strike a bee line, most probably they come across some familiar mark which memory makes known to them. A carrier pigeon when at first let loose, does not fly in a bee line to its destination, but flies around and around in a circle until it gets its direction and then strikes a straight line for home. Undoubtedly these animals mentioned have a sense of direction stronger than most species of animals, but even with them their memory is taxed and used to locate the direction of their flight.

CHAPTER V.

Gray Matter and Sense Nerves and Cells.

These minute rounded cells in man called neurons radiate in branches or fibres. There is an envelope over the brain under and next to the skull called the Medulla sheath, a sheath which affords an added protection to the interior mass below the envelope. There is a soft substance called gray and white matter. The white matter underlies the gray and is more abundant. The gray matter descends down into the crevasses and sutures, between the foldings, the convolutions, and as it is settled that it is the seat of intelligence, much more so than the white matter, it means a great deal as to the extent of larger surface in the byways of the foldings here and there. Some animals have very strong nerve cells in the frontal portion of their elongated brain, for example the dog possesses large, prominent olfactory nerves which enable it to scent an animal's tracks, as in the hound, the hunter's companion, and the bloodhounds used to hunt

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and trail an escaped criminal by smelling his tracks in the path of his flight, and the rabbit has them largely developed as one can detect by watching his nostrils swell when startled by a strange sound. A rat has the organ well developed above the ordinary animal, as the housekeepers discover when one is caught in a rat trap, and in order to trap another the trap has to be scalded to remove the odor that the rat detects from previous use. The nostrils of a horse are seen to dilate when approaching danger and it sometimes cannot be induced to go ahead, fearful of some catastrophe. Also the optical nerves are enlarged, for they have greater powers of vision than man. Any one much accustomed to driving is aware of this, as for example in a dark night, the horse driven by a careful driver is given free rein for he can see farther ahead than man and is more reliable to keep in the road and escape any danger of collision.

In some animals the Auricular nerves are much enlarged, for their sense of hearing is very acute. A cat has the faculty in a large degree, so does the dog and the horse.

CHAPTER VI.

Impression of an Image on Cells.

Having given a cursory description of the brain and its ramifications and its functions, let us proceed to investigate and see what it has to do with the root, the primal processes of memory. We have been discussing the existence of the multitude of cells in the brain. We are cognizant that there are millions of them there, hence the notion that there is not room for long extended impressions from youth up, vanishes. There certainly could not be room for the impressions in their extended original size and form, but through some process they become reduced to microscopic size, and stamped upon a single cell, or neurons, which is preserved for future use, and can be recalled at any time if the impression was stamped deep enough and important enough to make an impress to be recalled when memory brings it up. Memory is not wholly subject to volition or will at all times at a moment's notice, for often one cannot recall a certain event or name, but

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by association of perhaps some similar event or name it may be recalled. Association has a great deal to do in aiding memory. The impress must be sufficiently reduced in size that the cell can receive it. Wonders have been performed in microscopic impressions. Many have seen the Lord's prayer printed on a little plate no larger than the head of an ordinary pin. I have in my cabinet a small plate the size of the head of a common pin on which is photographed a young man and lady rowing in an ordinary size boat down a stream and under my microscope is magnified to the size of an ordinary picture a few inches long. Can you begin to comprehend ten thousand million cells in the brain, when you can you will understand that there is plenty of room in the brain for every blessed item, every incident every scene, every landscape, or seascape, every picture, every discussion, every conversation, in fact everything that thought is capable of embracing, all being impressed upon the cells. Each and every item has a cell, an individual cell or neurons, single and alone on which it is stamped somewhere and somehow and ready to be called up at any time, as readily as the book crank is ready to put his hand on any book of his choice upon the library shelves. One must not fail to understand that all

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these impressions must be reduced to microscopic size to be impressed upon the cells. The millions and billions of cells and fibres are abundant enough and to spare for all the impressions collectively or singly as the occasion demands. Notwithstanding the tiny microscopic dimensions of a single cell and fibre, the impression is sufficiently reduced to suit, to fit any given cell. The solution of the problem and how we can retain the incidents in a long life, lies in the fact, that the cells and tissues are there for use and if any portion of these impressions are not disturbed the impressions weaken, like a blacksmith's arm, or the muscles of an athlete, if in disuse it weakens, and the size of the arm lessens, so with the memory of certain events if not called into use, they are finally left upon the shelf and weaken, and our volition cannot recall the impression desired. Sometimes in visiting my native place, from which I have been absent many years, an old acquaintance hails me, whom I have not met for a long time. I dislike to say I have forgotten him, and cannot recall his name, hence I wait until in conversation he will say something that will remind me of some incident in early days, and all at once it enables me to recall the name and person with whom I am conversing. If that event had not been

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stored away somewhere upon my brain cells, nerve centers, neurons or ganglions I never could have been able to recall it. Sir Walter Scott it is said, before passing through a severe fever had written a book and placed it in the publisher's hands and when he recovered, the book was mentioned by one of the family, but he had forgotten he had written and published the book, he could not call to mind the many incidents narrated in the book, with which he was so familiar before his illness. Some months after his recovery, the memory of it came back to him, but not all the incidents. A minister in his church gave all the routine of the services, prayer, singing of hymns and sermon, that he had preached the Sunday before, and when reminded of it, he could scarcely believe it, he failed to remember any portion of it.

CHAPTER VII.

Loss of Memory.

Disease or a shock will sometimes impair one's memory, either wholly or in part. I am familiar with a case in my town, where a friend had a slight shock, which partially injured his memory, especially in his attempt to recall and describe an event, his dates were mixed and the words in his description got mixed, he could not describe it to make any sense to his auditor, and yet he seems to be intelligent and can listen well and seems to appreciate and understand what you are talking about. Physicians call it Aphasia. I suppose when we read occasionally of a person leaving home, getting lost in his wanderings and fail to remember not only his home, but his name, the cells in which they are impressed, become impaired, through some shock of the nerves not necessarily paralytic, but a slight disarrangement of the tissues or nerve fibres, sufficient to check his ability to recall the past, and the same is true of a machine, a graphophone, a victrola for example, if any

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part of the record is injured it will fail to respond, and also any instrument in any way deranged. The fact, the idea, which is not material is there just the same, but the impairment of the instrument destroys the communication, the manifestation.

A neighbor, a brother-in-law, knew of a friend whose brother left home suddenly a few years before and had not been heard from. After some years of anxiety concerning his mysterious absence, the brother thought he would consult a psychic or medium, and during a sitting with Mr. Samuel Grover of Boston, a famous medium, years ago, a message came from a departed spirit and friend of the absent one and said that the brother was in San Francisco, Cal., in a hospital, that long before by some accident his head was struck in some way and he was rendered unconscious. He was taken to a hospital. He lost his memory so that he could not inform his attendants where he came from and had no idea where his relatives lived. Even his own name he forgot. His relative wrote to San Francisco to the hospital where the medium said he could be found and had a reply that a person meeting the description was still there they thought. The brother immediately started across the continent and arrived at said hospital and found the brother

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just as the medium had stated and brought him at once to his lost home, and finally his memory was restored.

The loss of memory is also caused often by the lack of nutrition. These cells upon which memory is planted need food as much as any other portion of the body and sometimes they are not able to assimilate the food offered the cells, and it passes off as waste, the lack of blood flowing regularly into them is not sufficient to nourish them, also the stagnation, the stoppage of its flow in that part causes the brain to become clotted, To find the proper nerve food for this deficiency is for your physician to determine. Memory is not always lasting. The school boy who commits his lessons easily, does not, as is well known, retain knowledge as long as the boy or girl who has to plod hard and long in learning what he is studying. Where the lesson is quickly acquired with but little effort it is not stamped or impressed as deeply upon the cell, like the blacksmith's hammer upon the heated iron, the harder the blow, the deeper and more lasting the impression. Deep study, well hammered upon the cell tissues is what is needed for long continued permanency.

CHAPTER VIII.

Sensory and Motor Cells.

The weight of the brain in comparison to the body is one to 40 and of the amount of blood sent over the body, one-fifth goes to supply the brain. The sensory cells and motor cells are centered in the brain. The sensory cells receive the impression from all parts of the body, for example, let me prick my skin with a pin, it is immediately conveyed through the agency of the sensory nerve or fibre to the neurons or nerve centers in the brain, and at once it conveys the impression to the motor cells which send it down the motor track or nerve, to the muscle where the sensation originates. The same force that enables the sensory nerve to convey the impression it gets outside to the nerve cell center, or neurons in the brain and to the motor cell, the same force I repeat that enables both the sensory and motor tracks to impress its force, its impulse on said cells must also furnish proof that memory with equal ability does make its stamp or impress upon

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the cells and neurons. The same principle that causes the voice whether in song or conversation to make its impression upon the record of the graphophone or victrola must be the same that impresses the song upon the grand sensorium of the brain, upon the tiny microscopic cells upon which memory is registered and recalled. I remember when those wonderful instruments mentioned were first introduced. I was told to speak through the horn to the instrument and learn that my voice and words would be recorded upon the sensitive plate and reproduced, and in the short space of a few seconds it was actually reproduced, not only the words spoken but the tone exactly like the original. If that can be accomplished as I have narrated, what is there to prevent any communication from any source that comes to me to be as easily and equally impressed upon the neurons or nerve cells in my brain.

CHAPTER IX.

Nerve Cells Classified.

Undoubtedly there are divisions or classes of nerve cells in the brain. When we listen to song, there may be a class of cells which are excited when touched, and which are naturally impressed more than other cells. Other cells easily sensitive to the reception of simple conversation, may exist in a class by themselves, so with the sensation of sight. We know that the optic nerves are easily exercised when anything beautiful attracts the eye and as easily disturbed and repulsed when any disagreeable thing attracts it, and the memory of it, when of beauty, is sublime and the memory of hideous sights we cannot always annihilate, so it is with music. How angelic will it linger in the chambers of memory when the cells are tuned up to highest tension and how terribly hideous is the memory of savage encounters that rack the brain with its murderous screams.

And then there is the class of cells that respond to the sense of smell and the class of cells that satisfy our taste or repel it, as unfortunately they do in everyday life.

CHAPTER X.

Cells Subject to Electrical Manipulation.

Calderwood, an eminent Psychologist, claims that the motor cells can be acted upon by the agency of electricity. It is possible that electricity may contribute some movement in impressing or recording doings upon the cells of our brain. It not only has performed wonders, but is today continuing to perfect communications of every description. Its composition has not been definitely analyzed as yet, although several theories have been advanced. Some call it a fluid and some a force, like heat and motion, and I am inclined to think the latter is the more reasonable hypothesis, for you view a lightning bolt or a spark from an electrical plate machine, endeavor to catch the latter or grab it and you find nothing but a smart sensation, no substance, tangible substance realized and it would appear that it was simply a motor or mode of conveyance, a force, a correlated force, like heat or light. You can feel the effect of the sensation when coming in contact

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with either, they are simply forces acting upon a substance which enables you to realize or feel its presence, the ponderable substance through which and by which it operates is simply a medium through which these forces make their power manifest. So it is with electricity, it is not a composition of matter, but simply a mode of motion, recognizable only when it comes in contact with some electrical substance that can make itself felt and it is possible can be utilized by nature in some way to record on the brain cells or tissues the impressions of our everyday life.

We know that man possesses electricity in his organization, as any one who has a superabundance of it can stand on a carpet and light his gas jet by the spark generated.

I was acquainted with a gentleman in New York City who by standing on his parlor carpet, by moving his foot could light his gas jet. Rub the back of a cat and you'll feel a spark and so will the cat. I once shook hands with Dr. Newton, who was a wonderful healing medium, healing by just putting his hands on his patients, and when I touched him he exclaimed, "Oh! it feels like ten thousand cats crawling over me," the contact of my person sent the electric current through his organism. So it is possible that the force of electricity has a hand

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in stamping or impressing our movements in some manner upon our motor and sensory brain cells and also in their reproduction in the form of memory when occasion demands it.

It is not always essential that every movement in our organism be conducted to the sensory track to our brain. Reflex action may regulate the movement when it is not operated by the will or prompted by any thought, for example, when we eat our food, after mastication, it drops down the oesophagus without working our will, also in the act of breathing we do not will the inhalation, or exhalation every second we breathe, that is reflex action, not using our volition, and is it not possible that electrical movements in our organism may have a hand in regulating the reflex action movement where volition is not an incentive in the movement of nerves and tissues in our body. These nerves centers in reflex action are probably subordinate centers that do not require transmission of sensation to the brain in any subordinate nerve or tissue movement. A low order or genera of the animal kingdom may have sensory and motor nerves without having any intelligence by a movement of them through reflex action.

CHAPTER XI.

Immortality.

The association of memory in the human organism or any animal organism, as to that matter, is one of the greatest proofs of immortality that can be produced. My body for example, which has existed 85 years upon this planet, is to a certain extent more or less decrepit and has lost the elasticity of youth, in a large degree, and yet my memory in an educational point of view is as fresh and active as ever, and perhaps more so, and so is my intellect. It enabled me to write "The Beginning of Man and What Becomes of Him" at 80 years of age, which has had quite an extensive circulation, and this book at 85. The fact that my mind and memory are in full strength and fresh in my old age, while my body is gradually weakening, is evidence that the mind, the memory, the force (call it spirit) is continuous, is immortal, unlike my body which is gradually decomposing and passing out of existence. The mind, the thought, which is spiritual,

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ethereal, presents itself to us without any material object coming to our notice. For example, we anticipate things that have not occurred to us previously, have not met our vision, such as anticipating meeting somebody whom we have never met, but of whom we have heard, picturing to us his image in our imagination, that certainly is not material, it has no connection with it, it is simply an idea, not tangible, you cannot handle it, for it is not a substance, to be sure it refers to a substance, but it is not ~~the~~ substance per se. It is only in our memory and imagination how that particular object or person might look. Not one of our material senses can come in immediate contact with it, simply because it is an idea, a thought, and not matter. The brain, the tissues, and nerves are the organs, the material instrument through which and by which the mind, the thought, the spirit operates. When the organ, the brain, becomes diseased or in any way impaired, by old age, being the machine, the instrument through which the mind, the thought, the spirit, the ideas operates, the latter becomes disabled, the same as an electric light when the electrical apparatus, the machinery is impaired the electric light stops, it does not work any more than the mind will if its machinery is out of order. Consciousness is not made up of

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cells or nerves, these organs are simply the instruments through which consciousness makes itself manifest.

Some professors of psychology teach that consciousness is the basis or the primal cause of memory, but that does not answer the question of what is the root, the material instrument through which memory can operate or make itself manifest. Memory, thought or any class of ideas cannot make itself, in itself and alone, in the least degree manifest here upon our planet without it operates through matter, a material instrument, such as the sensory and motor cells and nerves in an organism.

CHAPTER XII.

Old Age.

To some it is a puzzle as to how old people can recall events to memory that occurred in their youth and forget some things that have transpired in recent years. It is probable that is accounted for by the fact that in infancy there were but few cells developed in the brain compared to an adult later in life. Cells from infancy up have to grow and multiply and divide in their increase as age advances, hence there are but few cells to be impressed and being soft and plastic in early development are more easily and deeper stamped or impressed than in a maturer advancement, while in old age, the cells begin to lose their freshness and plasticity and commence to disintegrate and it requires greater effort to recall incidents impressed upon the ganglia of recent origin, but of course the work of restoration, the replacing the cells is to some extent going on by furnishing it with constant nutrition. It is said that some persons grow old at 40, while others do

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not grow old at twice that age. It depends upon the hardening of the arteries and the flow of nutriment in the blood to feed the cells, tissues and nerves in the brain, as well as in other parts of the body. We should now be able to see therefore that memory is the key to the solution of the problem, that mind, thought, ideas, spirit and soul are separate and live independent and free of matter after the decease of the body, for it is dependent on matter only so far as to enable itself to use the aforementioned organs or instruments to make itself manifest. As a further example of the separation of mind or thought from matter I will refer the reader to my last book written and published but a few years ago, entitled "The Beginning of Man and What Becomes of Him."

CHAPTER XIII.

Growth and Memory Impressions.

The process of decomposition is going on after 40 or 50 years of age, but is gradually nourished from day to day as the waste of decaying cells and tissues pass out of the body. This is an economical and wise arrangement of nature, for otherwise our bodies would be enormous in stature in the accumulation of matter.

Some things in nature never stop growing while life is present, such as trees, the big trees, the Sequoia of California which have been growing for three or four thousand years. When trees stop growing life in them is becoming extinct and decay results. The whale keeps on growing for a century or two, but man has generally reached the extent of his stature at about 24 years of age and often sooner. Fat accumulates as time goes on in many cases, but that is not considered growth in stature. Memory is prolonged through a long life by its continued use and exercise. When

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one is not accustomed to reading and cudgelling his brains in reflecting and studying what he reads and selecting such subjects that require thought in its analysis, no wonder that the gradual loss of memory and brain activity as age advances is slowly losing ground.

The mind needs as much exercise as the body and the body as much as the mind. What a blessing is the faculty of memory in the brain, if life has been pure and noble and unspotted before the world. But for a corrupt and unhappy life it cannot be called a blessing and that marks the difference between heaven and hell, and it appears to me the former condition in life is worth striving for, certainly there can be no question that it stands in this life or the other for heaven or hell (which is a guilty conscience) and the best guidance that I can call to mind is the Golden Rule "Do unto others as you would have them do to you."

CHAPTER XIV.

Stamped on Memory Cells.

Plato says "Every man has presumably in his mind a block of wax, which is of various quality, which is the gift of memory. Upon this block the perceptions which he wishes to remember are sealed or stamped. The memory continues only so long as the impression remains." Herbert Spencer also advances the theory that the brain cells are sufficiently plastic to record impressions and believes that memory recalls these stamped records at will.

Herring says that he assumes there is no common memory organ, but that each particular sense organ and every part of the nervous system has its own memory function and that particular nerve cells retain sense impressions, and that all impressions are not confined to the brain for the spinal cord has its own nerves to respond, a sort of reflex action. He further says when the filial (child) cell inherits the quality of the parent cell it may be said to remember what occurred in the present organism.

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It repeats what is feebly experienced as a part of the great whole." As an old man repeats in memory the experience of his childhood. Memory is a continuous process, and the whole series of organic life is the reproductive faculty of what belonged to the previous organic form, bequeathed to the descendants its properties, thus individual development in the higher animals is merely a reproduction improved upon, an evolution, and this explains the instinct of animals, a hereditary transmission.

CHAPTER XV.

Instinct.

The innate, reproductive faculty in the chick enables it to repeat easily the performance of its mother. We see this illustrated in the perfect development the day of its birth, its perfect independence in helping itself in search of food. When with the mother hen, the mother assists it, but when hatched from an incubator, it has no mother or guide, but picks up its food and selects it to its own liking. Also the act of the spider in spinning its web was acquired through innumerable generations of spiders and that is instinct through inherited memory. When a child is born it inherits divided memory cells, and thus its memory is a portion of the memory of its parent and a habit is transmitted from its parent, a part of its memory is transmitted through the double cells when the child is conceived and born.

Delagu says life is a reproduction and a reproduction of memory. Herbert Spencer in his chapter on memory says, "Instinct may be re-

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garded as a kind of memory. On the other hand memory may be regarded as a kind of incipient instinct." The automatic actions of the bee, are, as it were, originally remembered. Memory is not confined to the singular number, it is plural as well, for there are memories. There is an organic memory and a conscious memory. Organic memory is a kind of an instinctive memory or hereditary memory as of parental origin, while conscious memory is memory of events, scenes, etc., acquired with the consciousness that it has been previously experienced. Schneider says "that the higher class of mollusks and cephalopods show unmistakable traces of memory, even a snail, an oyster and the jelly star fish show signs of memory. I remember seeing an account of an instance where some obstruction was put in the path of a snail and it passed around it and on its return it remembered its previous experience, and passed back in the same path around it previously traveled."

Hammerberg says in the brain of an intelligent man the cells are numerous and large. In the brain of an idiot he found the cells were fewer. In the lowest order of intelligence, the cells are very few and seem to decrease in number and size with the lessening intelligence, hence with a smaller number of cells and

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dwindling in size can not give much chance to impress upon them as large a range of events and facts as a larger number and a greater size. A child's brain grows rapidly up to eight years of age and the increase after that is very small. The weight of brain remains about the same up to the beginning of old age, and then the loss of weight occurs. The weight of brain does not always determine the amount of intelligence. Dr. Hedge has proven that when the brain is fatigued, the nucleus of the cells shrink in size, hence less memory. Fatigue is a hindrance to good memory. The ganglion cells may from disease become obliterated, hence we forget. According to Colgrove, in the decade between 30 and 39 years of age memories involving reflection and thought appear to ripen. In the decade between 40 and 49 memory for persons seems to lessen. In the decade between 50 and 59 motor memories of males culminate. The motor memory in above sense relates to physical or material things.

CHAPTER XVI.

Distraction and Abstraction.

Loss of memory is sometimes due to distraction. A middle aged woman heard of her son's death by drowning, she could not telegraph to her husband, because she suddenly lost her memory from the sudden shock, forgetting his address, although she had telegraphed to him hundreds of times. Abstraction, or momentary forgetfulness, occurs at times through life. Sir Isaac Newton did not know he had eaten his dinner, until he saw chicken bones on his plate. Edison kept his bride-to-be waiting at the wedding, because he had forgotten all about it. A lady walked into her parlor with a ten dollar bill in one hand and a match in the other, she put the bill into the stove and saved the match. A great share of loss of memory is due to abstraction or absent mindedness, which is simply that the mind is absorbed in one thing or object to the neglect of anything outside of it. Secondary memory is a species of reflex action. It is related of Canon Gore

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that he was once present at the death of a pick-pocket who professed penitence. In the agony of death the dying man exclaimed in a coarse whisper, "look out for your watch." While uttering those words, he died, but his hands held the good Canon's watch. A case of unconscious reflex action and memory in the nerve tissues.

An account of a man is given who becoming very fatigued from riding his wheel lost his memory. Prof. Carpenter relates that a miner in a mine by overwork lost the memory of his native tongue.

Mountain climbers are obliged to note down their impressions at once on the mountain peaks as they suffer a lapse of memory due to fatigue. All mental acquisition must stop short of the extreme point of fatigue.

CHAPTER XVII.

Association.

Many persons see in the same object different shapes and forms, a peculiar blot on paper to a trapper or hunter will look like a beaver or a woodchuck, to a naturalist like a hedgehog and to a fisherman like a flounder, according as one's mind has been directed or attracted. The first line in a poem will suggest the second, also a new song will to a practiced musician suggest to his genius some tones in advance of hearing them and especially if he has heard it through once before. It is difficult to read the alphabet backwards. Association is recognized by similarity. The face or voice of one suggests a similarity to another.

The number and size of nerve cells of the brain differ in individuals as their mental vitality varies. The nerve centers in the brain most used become thicker. The time for laying a good foundation for memory is during youth and childhood. The cells and tissues become more plastic and more easily stamped and

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impressed. Up to fifteen it culminates as to memory's continuous growth and plasticity. It is greater in the young of animals as to growth. It is said it is always too late to become what you might have been. The plasticity of the nerve cells lessen as age goes on.

CHAPTER XVIII.

Improving Memory.

A lady in England some years ago acquired the habit when young of learning one verse of the Bible every day and after she had committed to memory two or three verses she would repeat them often until they were absolutely impressed or stamped on her memory cells and then after she had thoroughly remembered them she would commit two or three more and rehearse thereafter all six verses until thoroughly committed and so she kept on day after day in this fashion until she succeeded in learning the entire chapter, and after thoroughly committed and reviewed, she passed on to the next chapter, and when that was committed, and also the preceding chapter readily recalled, she passed on to the third chapter and hence in the same manner she proceeded through the book, but she was careful to rehearse the whole of the preceding pages she had committed carefully as she passed through the book, and continued until she suc-

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ceeded in committal of the entire contents of the Bible, and at her advanced age she was able at any time or moment to recall any passage in the book that she desired. In fact I have heard of others who had accomplished this feat. This is one of the best modes to commit anything desirable to remember and is one of the invaluable aids to increase and improve your memory. The Mohammedans in this same manner are able to repeat every word of the Koran to memory. Some writers claim that under certain conditions one can recall unconsciously without any effort of the will, things or scenes that have occurred through their life's experience, a sort of subconscious state, a reflex action as it were, for instance you often hear of one who nearly drowned. All his past life seems to rush before him in his memory and how important it is that we should so live in our every day life to have nothing to be ashamed of at the point of death, as will come to all of us. Everything we have done in life is recorded on the brain cells and is so stamped and impressed that it is liable under some circumstances to be recalled in our memory.

CHAPTER XIX.

Attention.

Attention is one of the most important things to aid memory. Giving attention to anything worthy of it and fix it in your mind, stamp it firmly on your memory cells for keeps. Repeat it to yourself until well fixed. Stewart says that the permanence of the impression which anything leaves on the memory is in proportion to the depth of attention which was originally given to it. The chief thing in memory is attention. Inattentive people have bad memories. Attention constitutes the better half of the intellectual powers. To give attention to a given subject that you wish to learn, but happens to be dry, uninteresting and tedious as it will surely be with some, exert your will and strive to give strict attention to it, study but a little at a time and not attempt to take in the whole situation at once and it will become more easily remembered. The reason why children and even adults become discouraged is because they are impatient and want to grasp the whole thing at

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once, but do as the old lady mentioned did in committing to memory every word and chapter of the Bible, just a little at a time, only as much as you can take in, no matter how little, even but a single word or two, and repeat it until thoroughly remembered. Count the number of pages in each chapter of this book or any book, and then the words on each page—keep recalling them, and then the outline of events, or ideas as you proceed, and recite them to some one or to yourself aloud, and by this procedure your attention and your memory will advance a step or two. Look at what you are reading or studying intelligently, not parrot like, without thought. A bank teller wanted to improve his memory of faces, for it was important in his vocation. He tried several methods, but could not seem to make any progress. The trouble was he took in the whole face at a glance and didn't remember, but finally he tried the following method, instead of taking so general a view of the face. He made it a point to observe a single feature, say the nose. Was it a well shaped Grecian nose, straight and well formed, or was it a Roman nose, large and a prominent projection in the middle, or was it a turn up nose at the end, or a pug nose? What was the color of the eyes, were they black, grey or blue, and was the look sharp, sparkling or

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dull? What was the shape of his chin, was it full and well formed or was it small and retreating? How about his perceptive faculties in front of his brain, was it well rounded or retreating, sloping backward? and how about his head of hair, what was the color, and did he have whiskers? and his mouth, did the corners or ends turn up or down? if up he is cheerful and optimistic, if turned down he is inclined to be morose and pessimistic. The teller persisted in his attention to these details and every once in a while he would recall them, and by practicing this method in detail daily instead of a general view he succeeded in his recognitions with ease.

The same is true about a house. What was peculiar or noticeable in its architecture, was it colonial, a cottage, a two story, and what was its color and what about the grounds surrounding it? Observe a horse. Was he grey, black, sorrell, chestnut or white, was he fat or lean, a bob tail or long tail, what would he weigh and how many hands high, were his knees sprung, was he sound, how about his teeth, what did they indicate as to his age and chewing food? Take in all the details separately and recite them to your friend and neighbor or to yourself. Atkinson gives these rules in looking at things: First, make your-

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self take an interest in the thing; second, see it as if you were taking written notes of it, in order to repeat it in detail to some friend. This will force you to take notice.

Third. Give to your subject a mental command to take particular notice of what you are looking at, say to it "Now you take notice what you are observing." Do this often and after a few trials you will find your memory improving wonderfully. Before you can remember or recall anything you must perceive that perception is only possible through attention, hence it has truly been said "that the great art of memory is attention." The processes demanded in every case of memory are first, attention to any given thing to stamp and impress it on the memory cells and then association is necessary to recall it at the command of your will. Where it is partially forgotten it is more readily recalled by associating it with something similar. Association is much resorted to in endeavoring to recall anything. For example, suppose you wish to recall the month the Pilgrims landed at Plymouth, you will remember it was during very severe cold weather and that half of the company died the first year, and hence you will be reminded it must have been in December and quite near Christmas. December 22nd was the landing

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and associate it with the shortest day in the year, the 21st of December, the day preceding. The more aid you can get from other scenes you are using in your work, the more it will help your memory. Use different senses to aid you. If you have poor hearing, it is well to call upon the sense of sight to assist the poorer sense of hearing by the sense of seeing, or vice versa. A really intelligent man is one who exercises and develops his memory all around, on all sides, not one sided. Napoleon, to make it more memorable, when he heard a name mentioned, wrote it down on a piece of paper, then tore it up and threw it away, in this way he had a double advantage, both his eye and ear memories were exercised. Exercise the weak arm of memory and cultivate it, the strong portion will take care of itself. Several questions were asked by the teacher of his pupils to find how many were closely observing things they were accustomed to see often. For example, a cat when it climbs up a tree, does it go up headforemost or not, and does it go down headforemost or hindforemost? Take a cow lying down, when she gets up does she get up on her fore legs first or her hind legs? How is it about a horse, does he arise on his hind legs first or his fore legs? Did you ever observe a cow's teeth? I knew of a far-

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mer who was asked by a wealthy gentleman farmer to look at his new thoroughbred cow, for which he had paid a high price and see if she had any defect about her. The old farmer looked at its mouth to examine its teeth, the same as a horse jockey examines the teeth of a horse when about to purchase, as to its age, etc. He told the owner of the cow that he paid too much for her, for she had no teeth on the lower jaw. The proprietor looked astounded. Why, said he, I bought her for a sound animal in every respect. Then the old farmer laughed and told him, "why, my friend, a cow does not have any teeth on the lower jaw. In chewing her cud she uses the jaw bone, which is more or less sharp." Now if the gentleman farmer had been a good observer he would have known this fact before. How about a pig, which way does he like to go when driven? Will it go right ahead readily or does it like to go in the opposite direction? It likes the latter, the same is true with a hen. The famous Houdini, the magician, trained his eye, in order that he might improve his memory, by the following method. In passing a toy shop window he began by enumerating two or three things therein and after impressing them on his mind he passed again and observed two or three other objects, and then recalling the

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first three, together with the last three, he could take them all in, and again on the following day he passed the window and observing more objects he charged his memory with them and recalled them all as far as he had gone, and then in the course of a week or so, he enumerated every article in the window, which contained a multitude of them, and could tell each one separately at any time obedient to his desire, and thus improved his memory which was very important in his sleight-of-hand business and he became a marvel to himself and the public. You must use your will to view, examine, or observe anything thoroughly and what is true of this is true in reading anything, especially anything worthy of remembrance. I well remember my old teacher, Master Seaver of Quincy, Massachusetts, narrating an experience when a young man calling on old President John Adams, second president of the United States. The President had a large library and the young teacher asked his advice what was best to read. Well, he told him he would advise him to read Shakespeare, and handed him a book from his library. The young man took it and during the following week he went through it and returned it to President Adams. Mr. Adams asked him if he had read it. Mr. Seaver replied in the affirma-

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tive. "Well," said the President, "what do you think of the soliloquy of Hamlet?" The young man scratched his head and after some hesitation replied, "I cannot seem to recall that." "And you say you read the book through?" asked the President. "Yes, I did," said Seaver. "Well, now suppose you take the book home, young man, and read it, not simply pass through the book hastily, but read it understandingly, a part at a time slowly until you can recall the main incidents one after another, and when you have given it a thorough, thoughtful reading return the book." He complied; this time he read the book; it was stamped upon his memory cells, and when the President catechised him this time he was posted and was able to talk intelligently about it. "That," said Seaver, "was a valuable lesson to me. I gave my whole attention to a book that I wished to remember and read it understandingly, slowly and studiously." The Hindoos train their youth's memory by playing the "sight game," placing small objects out of doors and tell them to observe each object carefully and where there is a company of boys each will try and excel the other and will describe each carefully.

CHAPTER XX

Ear Cells in Memory.

Train "the ear" as well as the eye. When a person speaks as in giving a lecture or sermon, train the ear to listen attentively to what he says. Don't attempt to remember word for word but impress upon your memory the gist, the substance of what he is talking about. Take in all you can; begin by taking in the subject simply of his discourse or lecture, tell your folks about it, and the next time you attend drink in a little more, only as much as you think you'll be able to remember. Talk about it, or perhaps what is better, note it down in your diary or on a paper block, and on each Sunday you hear a discourse jot it down on your block, all you can recall, and by continuing this habit you'll be able in time, little by little, to give a good account of a lecture or sermon, and also you will be astonished to find what a remarkable improvement you have made in your ear memory. It means work, of course, but did you ever know of anything worth acquiring

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without strenuous attention and application? Genius, so much admired, is the sum of labor and perseverance. The ear memory can be cultivated and improved to a wonderful extent. I recall the ease I can hum a tune after hearing it once or twice on a Victrola. But, you will say, "You have probably a good ear for music." It has been made so by close attention to the tune and a love for it. When I hear a tune somewhere I enjoy, I get the title of it and purchase the sheet of music at Ditson's Music Store and copy the song on a sheet of paper. Copy the stanza or bars and place the notes in their proper position on the bars and the words I write underneath the bars corresponding to the notes above, no more, no less, and when I am out of doors at work among my fruit trees and vines, I pull out the paper now and then, learn the tune from the notes and the words and after a while when I think my memory is sufficiently impressed or stamped with the tune I go to the piano and set my eye memory, with the assistance of my ear memory, at work. I attempt to play the tune and after a while I succeed without notes and this is done when I am busy at work physically out of doors, a little at a time. In this way I learn many tunes and recall them months afterwards without being confined to any notes and am

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not obliged to use them in playing the piano, as many young ladies are apt to say when asked, "Oh, I can't without my notes." Many persons are apt to think their hearing is defective, when if they would give their whole attention to the speaker they would find it would help them. Let your sight memory cell assist your ear memory cell, by looking straight at the mouth, the same as has now become the habit of deaf and dumb persons in using their sight memory in watching the movement of the lips. I once attended a lecture in Washington on which occasion Alexander Graham Bell, of the Bell Telephone, was the presiding officer. His wife was a deaf mute and sat in a box stall near the stage. After introducing the speaker, Prof. Bell passed from the stage into the box and sat facing his wife and I could see him repeating to her the words of the lecturer as fast as they were delivered. She read the movement of his lips. How quickly a mother will hear a child when it gives a whoop, with the whooping cough. I have been present on such an occasion, when I could not detect the faintest noise from the child, when the mother's trained, delicate ear, caused her to jump immediately to the child's side at the first whoop.

CHAPTER XXI.

Remembering Names, Events, Etc.

This is important to a grocer, a merchant, lawyer, minister and everybody. Gov. John D. Long had a remarkable memory. I often knew him to recall names of persons whom he had met but once. Washington could recall the names of many of his soldiers, it is said. Napoleon could remember the names of a large number of his soldiers, and it is said of the Roman general, Trojan, that he could recall the names of his soldiers to the number of twelve thousand. Detectives by long practice display much ability in detecting faces and also names. James G. Blaine could remember faces when once his attention was given to anyone. So could Henry Clay. Somewhere in Louisiana, where he was stump speaking, he met an old man, rustic in appearance, who while Clay was speaking, said to a neighbor standing close by, "When Mr. Clay gets through I am going up

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to shake hands with him. I haven't seen him for 40 years and I am going to see if he remembers me." When Clay had finished, the old fellow went up and shook hands and asked him if he remembered him. Clay looked him over and said, "Are you the man who sat on the jury (naming the town) some 40 years ago in a criminal case I tried at that time?" The fellow replied that he was the man. It will help your memory by drawing a profile of the face of one you have met, and especially of one you desire to remember, if you meet him or her again. Do it from memory at home. I am acquainted with an artist, who on the death of a boy, a neighbor, whose mother was anxious to have her son's likeness drawn. There was no photo extant, and the artist being familiar with the features of the boy, set herself to work and drew largely from memory a crayon portrait of the deceased, to the satisfaction of the parents. An expert gambler can, by watching an opponent's features in playing cards, often tell what kind of a hand he holds, the lines of his face will reveal his chances of success or defeat. And there are some social card players, who by giving close attention to what his or her opponent or partner has played, and keeping the run of it, will win the game, and this is a good practice to cultivate memory, by

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giving close attention, a very important factor in the cultivation of memory.

Cultivate your memory of occurrences. Practice every evening by rehearsing to yourself or to somebody else, the occurrences and your experiences during the day. Put down upon paper, if you feel in that mood, and note all the observations that has attracted your attention. Pursue this every evening and your memory will inevitably increase.

In remembering facts, Atkinson gives the following rules:

Ask yourself the following questions:

1st. Where did it come from or originate?

2nd. What caused it?

3rd. What history or record has it?

4th. What are its attributes, qualities or characteristics?

5th. What things can I most readily associate with it?

6th. What is it good for, how may it be used, or what can I do with it?

7th. What does it prove, what can be deduced from it?

8th. What are natural results, what happens because of it?

9th. What is its future, its natural or probable end or finish?

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10th. What do I think of it on the whole, what are my general impressions regarding it?

11th. What do I know about it, in the way of general information?

12th. What have I heard about it, from whom and when?

Apply above to any forgotten facts.

CHAPTER XXII.

Summary.

Give as close attention as possible to the thing you wish to remember. In endeavoring to recall anything, try to gain the impression originally made through as many faculties and sense impressions as you can. Use what has been said about association. Associate some similar name or event to remind you. Endeavor to make an impression good and strong. Fix it in your mind, stamp it on your memory cells and tissues for all time. Use all the facts and associations connected with the thing as much as possible.

It is well known that in old age one is troubled seriously with forgetfulness in things of recent moment. That is easily explained, as before mentioned. It is known as age advances above a half a century the brain cells, the memory cells are constantly decomposing, the same as all cells do in the human body, and when a person has arrived at the age of three score and ten, the renewal of these cells,

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through nutriment taken in the body, is difficult to keep in trim. The memory cells which are material, not mental, and through which memory or the mind, the life, the spirit acts, are weakened by age and being simply an instrument, an implement, it cannot retain in its weakened memory cell recent incidents as in younger years, but by constant use of them, as in keeping up studies and constant exercise of thought, will prolong one's memory.

Children do not have as many cells to impress, but the cells of a growing child are constantly increasing as age advances. At an advanced age the memory cells cannot retain as many facts and events as in early life. An event occurring in old age, or the name of a person or thing presenting itself then is impressed or stamped on cells not as soft or plastic as when young, hence less easily retained.

The cause of some persons being able to memorize easier than others is due to more plasticity of the memory cells or tissues in the brain than others. The thought is more easily stamped on the memory cells than on those whose cells or nerve tissues are harder or more solid. Same as one's flesh is softer than others, and thus the former's memory is more easily recalled, but it is doubtful if their memory is as lasting as on another person's brain cells

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that are firmer. Some children can commit to memory their lessons easier than others, but those who have more difficulty in memorizing often retain what they learn longer and stronger than those who memorize more easily. When anyone has passed middle age their memory cells have become firmer and harder by advancing age and are not as easily stamped as in earlier life, hence cannot remember as well. Young children, under 10, have fewer developed memory cells, hence when sent on errands they cannot retain long what is told them. Don't scold them, they cannot help it.

In conclusion, I am of the opinion that memory is a resultant of motion in the brain which retains the impression of thought by stamping it, the instant created, on the memory cell, reduced to a microscopic atom, among millions upon millions of cells located in the brain. That is to say, the thing to be impressed or stamped, must be reduced in the act of stamping to microscopic dimensions on the memory cells, somewhat analagous to the photographic illustration heretofore mentioned earlier in this treatise, where I spoke of the tremendous, almost unbelievable reduction in size from a common print of the Lord's prayer to a small microscopic spec, and still readable by the aid of a powerful glass. The millions, aye, thou-

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sands of millions upon millions of cells in the brain must of necessity be exceedingly microscopic, infinitesimally minute to enable them to occupy the space allotted to them in the brain, the minuteness of which has been proven by several scientific and psychological investigators.

PART II.

ANALYSIS AND CAUSE OF UNCONSCIOUSNESS AND SLEEP.

By LYSANDER S. RICHARDS

CHAPTER I.

There is on record a man who fell during intoxication. He was picked up and conveyed to a nearby hospital in a death-like sleep, and although he kept alive for a year or more he was dead asleep and unconscious. He was fed by an attendant, but for some reason the physicians could not wake him or find the cause of his trouble, or the remedy, but after continuing a year in this state of unconsciousness they tried the experiment of trepanning his skull and found when the part trepanned was lifted, the brain pressed outward and he at once opened his eyes and his consciousness returned. His recovery was speedily attained, hence it was claimed that the pressure of the fractured portion of the skull pressed so hard on the brain within that it put him to sleep and a

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loss of consciousness resulted. That there is a decided tendency to expansion of the brain during activity may be regarded as a matter of fact.

When it has been so exposed from injury that its behavior can be observed, it has always been noticed that while during sleep the organ tends to sink or to retire from the inner surface of the skull, in wakefulness it expands and not only fills the whole cavity, but may protrude beyond the aperture if it has the chance. The more immediate result of the combined muscular and blood agitation is an increase in the bulk of the brain and a second result is an increase of stress through the whole cranial cavity. The flushing of the capillaries with the moving blood is the cause of the second. As the brain occupies a close, rigid cavity which must be constantly full, it cannot retire from the inner surface of the cranial wall without some other material taking its place. The combined cardiac, (which means affection of an artery near the heart as in the difficulty of breathing as Cardiac Asthma), and capillary forces urges the blood onward from behind, the passive resistance of the atmosphere without tends to press that fluid backward. As an unsympathetic touch is sufficient to check the vibrations of a bell or glass and abruptly put a

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stop to the musical tones, so when the grey matter layer of the brain is subjected to pressure the infinitely subtle vibration or active molecular changes in its tissues are checked and that means a step towards unconsciousness and sleep. As the special function of the brain depends largely on the cerebrum through which mental phenomena operate such as sensation, thought, and voluntary motion becomes suspended sleep is induced. In the causation of sleep, we have not only one or two, but a combination and succession of conditions inseparably linked together. The first change is a modified movement in the molecules of the brain tissue; the last is a compression inward of the organ. From lessened activity of the molecules, spring a less active state of the capillary circulation and diminished stress through the cranial activity. Next we have a change in the balance of circulation in producing which the weight of the atmosphere 15 pounds to the square inch, causing a backward pressure in the cerebral veins is an essential agent. With the altered balance of the circulation there is a change in the balance of active pressure, it is less from within and more on the surface! It is less expansive and more compressing. With a certain amount of inward compression consciousness is suspended.

CHAPTER II.

The occurrence of a change in the balance of the encephalic circulation may be regarded as the central point of the theory. Some modified molecular action is, of course, the primary cause of sleep and foundation to build upon; but the proper balance of the circulation is the keystone which gives unity and stability to the superstructure. There is no more certain or speedy means of producing sleep than the compression of the internal carotid (the carotid is a certain vein in the neck, sensitive to much pressure, for example the pressure of the finger upon it, etc.) It is sometimes difficult to catch the vein or vessels accurately, but once fairly under the fingers, the effect is immediate and decisive. There is felt a soft, humming of the ears, a sense of tingling steals over the body and in a few seconds complete unconsciousness and insensibility supervenes and continues so long as the pressure is maintained and on its removal there is confusion of thought with return of tingling sensation and in a few moments consciousness is restored. The stress through the whole

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cranial cavity must be kept equalized. In sleep the arteries are smaller and shrink, the veins larger, swelling. The authority for the above is Prof. Cappie. I think there is a wheel within a wheel that he does not sufficiently emphasize. It is a primal cause in the compression of the outer or inner surface of the brain, something that causes the unequal pressure of the mass within the cranial cavity, and that is fatigue. The fatigue which results from the labors of the day lacks sufficient stimulus to keep up the equilibrium in the brain to counteract the fifteen pounds to the square inch of the atmospheric pressure without. The nerves of the brain get wearied as well as other parts of the body by excessive labor and sleep, which is the handmaid of unconsciousness, must result. Sleep and unconsciousness is a partial death I say partial insofar as the loss of consciousness is but the highway to the beyond and a person asleep takes the first step to it, but there being sufficient stimulus left in the brain and the rest from inaction recuperates sufficiently to give it renewed strength and arouses the body to action and calls the soul, as it were, back into consciousness again.

A continual waste of the body is evident every moment during our waking hours and has passed from our body never to return, so

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that in course of years, whether seven, as is claimed by some, or more or less, decomposition or death of the old body in its daily waste has returned to Mother Earth, and if it was not for the blessings of sleep whereby we lose our consciousness in enabling us to rest our nerves and the various activities in allowing our bodies to gain sufficient stimulus to set in motion again, death beyond recovery would certainly ensue. The absence of noise and perfect quiet is conducive to sleep, but one can most always promote sleep when the noise is continuous. I was once at Sutter Creek, California, at the gold mines there located, where the stamp mills for crushing heavy blocks of ore are continually pounding, attended with an excessively loud noise, night and day, which could be heard plainly a mile away, and my abode at that time was a half a mile from the mill. I thought it not possible to get used to it and be able to sleep, but after a few nights I began to sleep and continued to sleep well nightly and when once in a great while, (perhaps once a month), the mill ceased to work, the cessation of the crushing and pounding in the mill for a day and a night, seemed as difficult to get accustomed to, as did the noise of the pounding and crushing of ore in the first instance.

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It is the monotony of the thing, hour after hour, day after day, that dulls stimulus in the brain, which gets accustomed to an unusual disturbance.

CHAPTER III.

It would appear that sleep or unconsciousness is due not so much to fatigue as to the exhaustion of the nerve cells, for the nerve cells are not the center of vital energy which lies in the heart. Hence, if an awakening from sleep was left to the cells alone, you would never awake in this life, but the restoration must wait until sufficient energy has been brought about by nutrition, which is constantly going on feeding it, but at times more than at other periods. If a lack of sufficient nourishment in the form of blood is wanting, of course consciousness cannot be restored, and death must result. Difficulty often happens in gaining normal sleep when one gets over tired and the patient must wait until sufficient nutriment in the circulation of blood has accumulated to feed the cells.

A monotonous stimulation continually active becomes eventually ineffective and one can go to sleep. Continuous noise becomes monotonous. Professor Sidis says vary the stimulus in quantity or quality and the cell or neuron re-

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acts once more. Excess of it is called stimulus exhaustion. By repetition the stimulus exhausts itself and can no longer call forth a reaction in the cell, although the cell may possess a large amount of disposable energy.

CHAPTER IV.

Putting the same general law in different terms, we may say that sleep is produced by monotony. The cell or neuron may be regarded as a reservoir of energy. The cell stores up energy as it does food in order to meet the demand for its exercise. In regard to storing up energy, the law of stimulus exhaustion may be regarded as a safeguard to the cell. If the stimulation continues to draw more than its share, the door closes and the stimulus knocks in vain against the locked door. When the maximum amount is drawn, there is no longer response to that particular stimulus, the cell no longer reacts, it is asleep. When the cell has recuperated, the cell is once more ready to react to the given stimulus. When the cell is active and awake it liberates energy, and when it sleeps it stores energy. Prof. Sidis says we do not dream when we are asleep. The person may be asleep to all else, but will be awake to special stimulus whose thresholds are very low. Like the mother who, when attending her sick babe is asleep in relation to certain stimuli,

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even when sound asleep to loud noises, but wide awake when any change is made in the wakefulness of the babe. They have lost touch with the external world, but the ones cared for still have a firm hold on them. We go to sleep when our consciousness is wearied and desires no longer to communicate with the active world. We sleep when we wish to rest from the external world. The organism falls into sleep when the thresholds rise. Thresholds here are meant that at the beginning of the loss of consciousness, wakefulness and activity is beginning to be shut off, an imaginary bar is being placed between consciousness and unconsciousness or between sleep and wakefulness. No amount of stimuli is allowed to draw upon energy when it has reached its maximum. The organism is no longer awake to the stimuli, it is asleep. Sleep is a limitation of voluntary movements. It is as much due to reflex action as is the act of swallowing or breathing. It is at times due to the working of the will or volition, just as swallowing at times is a special effort of the will. One's sleep can largely be controlled by the will as for example, when you retire for the night and your mind is disturbed by some pleasurable excitement or by some unpleasant event, instead of dwelling upon either when your purpose is to sleep,

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drop it from your thoughts, allow yourself to think of nothing exercising thought, make the mind blank, as vacant as possible, exercise the will, but not to tediousness, continue it mildly, night after night and insomnia will be obliged to take a back seat and your will is triumphant. Cells get exhausted of energy and become inactive, there is a lack of blood in the brain, it becomes anaemic and the carotid artery in the neck becomes compressed. In a dog or cat the carotid artery in an experiment by a scientist has been compressed, which resulted in sleep and also with man. In cases of insomnia persons have been put to sleep by compressing this artery.

CHAPTER V.

The loss of consciousness in sleep being due to the inaction of these nerves or cells in the cortex of the brain. (The cortex is the outer covering of the grey matter in the cerebrum, the frontal portion of the brain) and in cases of accidents on the head, when the person becomes unconscious, that part of the brain becomes for the moment paralyzed, as it were, consciousness ceases to work. The loss of memory in general is due to the impairment or derangement of the conscious cells in the cortex of the brain. An intimate friend told me of a case in the family where she was boarding, suffering from what they supposed was nervous prostration. He had lost all knowledge of his whereabouts, could not remember any of the familiar objects in the chamber where he lay an invalid, had no conception where he was, knew nothing of his past life. He was perfectly harmless, simply a complete loss of memory, of consciousness. These cells or nerve tissues in the cortex, where they are located, had become inactive and finally in course of weeks or months, his health became restored and his memory returned.

CHAPTER VI.

Dreams.

In consulting the writings of authors on dreams in the Boston Public Library and Congressional Library at Washington, I could not find any work giving a plausible theory of the cause of dreams, they were mostly on the interpretation of them or the peculiarity and novelty of the thing and not the cause or origin.

"Imagination," according to Prof. Greenwood, "has much to do in dreams, but he claims that you cannot imagine anything that did not previously exist or occur in some form somewhere or sometime." That harmonizes with the proverb that "there is nothing new under the sun." In a dream it may be something that is not a reproduction of anything ever occurring as far as your memory is concerned, but that is no reason why it did not enter your mind sometime when it was not stamped sufficiently strong or deep on your memory cell to remember it some time later, for such events do present themselves to the mind when it was not im-

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pressed upon the memory cells with especial distinctness. Of course everything which strikes the optic nerve in our vision must pass to the grand sensorium of the brain and perhaps it may remain there but a moment, not long enough to be stamped forcibly on the memory cells. My theory as to the cause, or what makes us have such strange dreams at times, I find partially explained in my work on "The Evolution, Analysis and Cause of the Existence of Memory." In that treatise I allude to the make up of memory cells in the brain, how located and their function. There we find millions upon millions of microscopic memory cells and that every act, every idea, every observation, every thought, every conversation in life is stamped on each memory cell just as perfectly as a stamp impressed on melted red sealing wax. Plato over 2000 years ago advanced the same hypothesis on the origin of memory. Some events, happenings or impressions are stamped deeper on these cells than others and are more lasting and more readily recalled and brought to mind than others. A child's memory cells are soft and more plastic than an adult's and hence more deeply stamped than when older and that is why the aged can remember and call to mind things that happened when a child more readily

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than ordinary events of more recent date. The cells decaying are continually replaced by new. Now when we are asleep, we lose our consciousness and our brain is not normal, it is at times however in sleep more or less active, but our perception or reasoning faculties and cells do not work in harmony, hence in that condition our peculiar, incongruous thoughts are in motion and in its unconscious workings it picks up a memory cell or cells near at hand regardless of its reasonableness or accuracy in the line of thought pursued in our waking state. The saneness of our dream thoughts may be more or less correct, but generally less. Our reflective faculties are more likely to be asleep and the memory cells are picked up in our unconscious sleep. Its power generally speaking, in the perceptive selection of sensible, harmonious sentences of plausible lines of thought is defective and broken. The animal faculties are located in the cerebellum and it is that portion of the brain that is most active during sleep. While the perceptive, reasoning organs are resting and unconscious, hence oftentimes those undesirable, heterogeneous flow of nonsensical dreams. Of course we know that sleepers at times during loss of consciousness work out difficult mathematical problems, that they failed to do in wakeful hours and

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also others in their dreams have moments when things come to them of importance that they failed to recall when awake, but these instances are exceptions. Generally dreams are not plausible, are unreasonable, fanciful, pleasant and unpleasant, and at times tragical and distressing, which sometimes are due to a heavy weight laying on the breast, which cause difficulty in breathing, as in rushing late to a train, or something pressing forcibly upon the brain may arouse the sensation of fear, or it might be something pressing on the cells of mirth, or as in opium eaters, the sensation of excessive imaginary bliss. The reasoning faculties of the brain in brief are asleep, unconscious and are at rest, and it is only when a portion of the brain is asleep and at rest that some mischievous unruly cells, like vampires, are active at night and often so strenuously at work, the sleeper awakes tired and loses the rest necessary for recuperation, sometimes due to a disordered stomach, late suppers and dinners, which influence indirectly the brain, as too much whiskey disturbs the healthy, harmonious, wakeful, normal activities of the brain. The brain cells are as liable to disease as any part of the body and when the brain is in that undesirable condition, not only will it manifest inconsistencies and unreasonableness in dreams,

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but also in our waking, active operations of the day and our memory cells are liable to be picked up without any harmonious relation, one to the other, in the formation of reasonable, plausible meditations, followed in our wakeful, normal, healthy, everyday thought.



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